DOCUMENT RESUME

ED 255 865 CS 007 974

AUTHOR Baumann, James F.
TITLE Effect of Restructured Content Textbook Passages on Middle Grade Students' Comprehension of Main Ideas: Making the Inconsiderate Considerate.
PUB DATE Nov 84
NOTE 14p.; Paper presented at the Annual Meeting of the National Reading Conference (34th, St. Petersburg, FL, December 6-8, 1984).
PUB TYPE Reports - Research/Technical (143) -- Speeches/Conference Papers (150)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS *Content Area Reading; Grade 5; Intermediate Grades; Readability; *Reading Comprehension; Reading Instruction; *Reading Materials; Reading Processes; *Reading Research; Reading Skills; Science Materials
IDENTIFIERS *Main Idea; *Text Structure

ABSTRACT

A study was conducted to apply what is known about how expository text structure variables enhance main idea comprehension and to determine if restructuring content textbook passages improves such comprehension. Original texts were rewritten to be more "considerate" as follows: the paragraph main ideas were rewritten and placed in the first sentence within their paragraphs, the passage main idea was placed in the first sentence of the rewritten version, a passage title and paragraph subheads were written to cue the passage and paragraph main ideas respectively, the passage and paragraph main ideas were typed in italic and underlined, and content--although not different from the original versions--was restructured in the rewritten versions to be consistent with the hierarchical main idea organization. Fifth grade students were tested in two settings, in each of which they read one original and one rewritten science textbook passage and then responded to three different questions testing main idea comprehension. Results indicated that the students were able to compose significantly more correct passage main idea statements and paragraph main idea statements after reading the rewritten passages than after reading original passages, but demonstrated no reliable difference in their ability to recognize passage and paragraph main idea statements after reading rewritten passages or original passages. (Tables of findings and samples of original and rewritten texts conclude the paper.) (EL)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED255865

U.S. DEPARTMENT OF EDUCATION
NATIONAL INSTITUTE OF EDUCATION
EDUCATIONAL RESOURCES INFORMATION
CENTER (ERIC)

X This document has been reproduced as received from the person or organization originating it.

☐ Minor changes have been made to improve reproduction quality

• Points of view or opinions stated in this document do not necessarily represent official NIE position or policy.

Effect of Restructured Content Textbook Passages on Middle Grade Students' Comprehension of Main Ideas: Making the Inconsiderate Considerate

James F. Baumann

Purdue University

Paper presented as part of the "Getting the Main Idea/ Attending to What is Important" symposium at the 34th Annual Meeting of the National Reading Conference, St. Petersburg, Florida, December, 1984

CS 007 974

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY

James F. Baumann

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

Effect of Restructured Content Textbook Passages on Middle Grade Students' Comprehension of Main Ideas: Making the Inconsiderate Considerate

James F. Baumann, Purdue University

Much has been learned about students' ability to comprehend main ideas in expository prose. It is known, for example, that main idea comprehension is enhanced when: (a) main ideas are explicitly stated (Aulls, 1975; Baumann, 1984; Bridge, Belmore, Moskow, Cohen, & Matthews, 1984; Flood, 1975; Kieras, 1978, 1980), (b) explicit main ideas appear at the beginning of text sections (Aulls, 1975; Kieras, 1980; Williams, Taylor, & Ganger, 1981; Taylor & Williams, 1981), and (c) main idea statements are highlighted (Williams et al., 1981) or headings are provided (Doctrow, Wittrock, & Marks, 1978). Examinations of exposition for adults (Braddock, 1974) and children (Baumann & Serra, 1984) reveal that infrequently do authors present explicit main idea statements, especially at the beginning of paragraphs and text sections. Furthermore, inspection of content textbooks (Anderson & Armbruster, 1984; Anderson, Armbruster, & Kantor, 1980; Armbruster & Anderson, 1981) indicates that students commonly encounter "inconsiderate" text, in which the text structure makes it difficult for readers to determine an author's topic, purpose, or question from the headings, title, and topic sentences (if any). It was the purpose of this study to apply what is known about how main idea comprehension is enhanced by expository text structure variables to determine if restructuring content textbook passages results in improved main idea comprehension

Method

Subjects and Design

Fifth-grade students from an elementary school in a rural midwestern community participated in the study. A three-factor hierarchical design was employed: 2 (Version) X 4 (Text) X 2 (Group), with Version and Text being within-subject factors (Text being a repeated measure) and Group being a between-subject factor. The primary factor of interest was Version, in which science texts were presented in either an original (inconsiderate) version or in a rewritten (considerate) version. A second factor was Text, as there were four science textbook passages presented both in their original version and in a rewritten version. Since subjects could not read both the original and the rewritten version of the same texts, subjects were assigned randomly to one of two groups such that texts were nested within groups. This resulted in the students in one group having to read two original versions of science texts and the rewritten version of the other two texts; the second group read the complementary array of two original and two rewritten texts. Originally, 58 students were randomly assigned to groups (29 to each group), but during data gathering one subject from group 2 withdrew from school and another subject from the same group became seriously ill resulting in group sizes of 29 and 27.

Materials

One passage was selected from each of four current and popular fifth grade science textbook series (Ginn, 1980; Merrill, 1983; Scott Foresman, 1984; Silver Burdett, 1984). The passages were selected according to the following criteria: (a) each passage ranged from 350 to 450 words; (b) each passage was a complete subsection from a larger chapter and was coherent and comprehensible when excerpted from the greater chapter context, (c) comprehension was not dependent on graphic or pictorial aids (although all photographs and diagrams were retained); and (d) each passage was determined to be "inconsiderate" when the structure, organization, and explicitness of main idea statements were examined.

The four passages selected for the study were the following: (a) a 408-word passage (Glaciers) that describes how glaciers changed the surface of the land by erosion (Mallinson, Mallinson, Smallwood, & Valentino, 1984, pp. 227-229); (b) a 350-word passage (Force) that describes how force is required to make objects speed up, slow down, or change direction (Bendick & Gallant, 1980, pp. 238-239); (c) a 367-word passage (Scientific Method) that presents the five steps of the scientific method (Sund, Adams, Hackett, & Moyer, 1983, pp. 41-43); and (d) a 389-word passage (Cells) that describes the kinds and functions of plant and animal cells (Cohen, Del Giorno, Harlan, McCormack, & Staver, 1984, pp. 72-73).

Determining whether a passage was "inconsiderate" was accomplished by conducting a main idea analysis according to the procedure established by Baumann and Serra (1984). In this procedure, which was modified after Braddock's (1974) technique, a text is analyzed for the presence of main ideas at two levels: (a) a passage main idea, which encompasses all the ideas in a text, and (b) paragraph main ideas, which state the main points of individual paragraphs within a text. According to Baumann and Serra's scheme, passage and paragraph main ideas are either simple (direct statements from the text), delayed-completion (parts of two sentences are conjoined to form the main idea) or inferred (a main idea is present but not explicitly stated).

The original versions of the four science textbook passages were analyzed according to this procedure. The original version of the Cells passage is presented in Figure 1, and the corresponding main idea analysis is presented in Table 1. Note that in the original version of the Cells passage, the passage main idea was simple but stated in the second paragraph. Of the five paragraph main ideas, two were simple, two were inferred, and one was a delayed-completion type.

Each original text was then rewritten to be more considerate according to the following rules: (a) all inferred and delayed-completion passage and paragraph main ideas were rewritten as simple types (and awkward simple types in the original versions were paraphrased); (b) the passage main idea was placed in the first sentence of the rewritten version; (c) paragraph main ideas appeared in the first sentence within their paragraphs; (d) a passage title and paragraph subheads were written to cue the passage and paragraph main ideas respectively; (e) the passage and paragraph main ideas were typed in italic and underlined to highlight them; and (f) content, although not different from the

original versions, was restructured in the rewritten versions to be consistent with the hierarchical main idea organization. The rewritten version of the Cells passage is presented in Figure 2, and the main idea hierarchical structure of this rewritten version is explicated in Table 1.

Procedure

Subjects were tested in a single large-group at two different sittings. In each sitting, the students read one original and one rewritten text. Version (original, rewritten) and Text (i.e., the four different passages) were counterbalanced within and across sittings. All data were gathered by the experimenter.

At the beginning of each testing session, the students were told that they were going to read some science textbook selections and to answer some questions that dealt with main ideas. The students read the passages silently. The experimenter and the classroom teachers helped students pronounce difficult words. After reading each of the two passages, the students were required to respond to three different questions that probed for their main idea comprehension. Students were not given access to the passages to answer questions. The first question was a recall item that required the students to "Write one complete sentence that tells you the main idea, or the most important idea, of the entire passage." The second question was also a recall item that required the students to "Now write complete sentences that tell the main ideas within the passage; that is, write one sentence for each of the important points that you can remember from the passage." The third question was a recognition item which required the students to select five statements, from a list of 12, that were main ideas from the story. This list contained the passage main idea and four randomly selected paragraph main ideas. The seven distractors were details from the passage.

Responses to questions 1 and 2 were awarded full, one-half, or no credit as determined by a priori criteria of acceptance. Hence, a total possible score for question 1 was 1.000. Since there were different numbers of main ideas within the four science passages, raw scores for question 2 were converted to proportions for analysis. The experimenter and a graduate student independently scored 20 randomly selected test booklets and demonstrated a 93.5% agreement score for question 1 and a 91.25% agreement score for question 2. Question 3 was scored objectively, and a maximum possible score was 5.0.

Results

Table 2 presents mean performance on the three questions by Version and Text across Groups. Table 3 presents mean performance for the same questions by Group and Version across Texts. Maximum possible scores for questions in Table 3 are double those in Table 2 because each score was based upon two original or two rewritten texts.

Separate 2 (Version) X 4 (Text) X 2 (Group) analyses of variance with repeated measures were conducted for each question. The ANOVA for question 1 revealed a significant main effect for Version [F (1, 54) = 4.35, $p < .04$], indicating superior performance by students on the rewritten version. There were no significant main effects for Text or Group. There was a significant Version by Group interaction [F (1, 54) = 4.35, $p < .04$], indicating that group 1

students provided greater discriminating power between text Versions than did group 2 students.

ANOVA results for question 2 revealed a significant main effect for Version [F (1, 54) = 4.15, $p < .05$], again indicating superior performance by students on the rewritten version. There were no significant main effects for Text or Group nor any significant interaction.

The ANOVA for question 3 failed to detect any significant main effects or interactions.

Discussion

To summarize, the results of the study indicate that fifth-grade students (a) were able to compose significantly more correct passage main idea statements after reading rewritten (considerate) science textbook passages than after reading original (inconsiderate) science textbook passages; (b) were able to compose significantly more correct paragraph main idea statements after reading rewritten passages than after reading original passages; but (c) demonstrated no reliable difference in their ability to recognize passage and paragraph main idea statements after reading rewritten passages or original passages.

The results that indicate that restructured content textbook passages enhance students' ability to compose or construct main ideas suggest that publishers ought to more often explicitly state important information in textbook passages and that they ought to directly cue the important ideas through the use of headings and italic or boldface type. However, more research involving students of different ages and texts of different types is needed before such statements can be made with great confidence.

How might the students' inability to perform better on the recognition task after reading the rewritten versions be explained? One explanation is that because recognition tasks are consistently less difficult than recall tasks (see Baumann, 1981, 1983, 1984), the recognition task failed to challenge adequately the students. However, because the students were able to recognize only 48% of the main ideas after reading original versions and only 50% of the main ideas after reading the rewritten versions, this hypothesis is discredited, as there was no ceiling effect for either group.

A second possibility is that the recognition task itself overrode the advantage afforded the students when reading the rewritten versions because then all main ideas were explicit, regardless of the text version that was read, and, therefore, all students then had an equal opportunity to identify the correct main ideas. In other words, when the students were called upon to compose or construct main ideas, the rewritten texts provided a distinct advantage since the students had seen previously direct statements for all passage and paragraph main ideas which aided their memory; however, when called upon to simply recognize main idea statements, the rewritten texts failed to provide the advantage since the response format itself provided explicit main ideas for each passage regardless of its version. However, because the more common and useful task for study reading is to recall (i.e., compose or construct)

important ideas from a previously read text, as opposed to simply recognizing important ideas, explicitly stating and cuing important information in content textbook passages are text-based variables worthy of consideration in future research if not in the development of instructional materials.

References

Anderson, T. H., & Armbruster, B. B. (1984). Content area textbooks. In R. C. Anderson, J. Osborn, & R. J. Tierney (Eds.), Learning to read in American schools: Basal readers and content texts (pp. 193-226). Hillsdale: NJ: Lawrence Erlbaum Associates.

Anderson, T. H., Armbruster, B. B., & Kantor, R. N. (1980). How clearly written are children's textbooks? Or, of bladderworts and alfa (Reading Education Report No. 16). Champaign, IL: University of Illinois, Center for the Study of Reading.

Armbruster, B. B., & Anderson, T. H. (1981). Content area textbooks (Reading Education Report No. 23). Champaign, IL: University of Illinois, Center for the Study of Reading.

Aulls, M. W. (1975). Expository paragraph properties that influence literal recall. Journal of Reading Behavior, 7, 391-400.

Baumann, J. F. (1981). Effect of ideational prominence on children's reading comprehension of expository prose. Journal of Reading Behavior, 13(1), 49-56.

Baumann, J. F. (1983). A generic comprehension instructional strategy. Reading World, 22, 284-294.

Baumann, J. F. (1984). The effectiveness of a direct instruction paradigm for teaching main idea comprehension. Reading Research Quarterly, 20, 93-115.

Baumann, J. F., & Serra, J. K. (1984). The frequency and placement of main ideas in children's social studies textbooks: A replication of Braddock's research on topic sentences. Journal of Reading Behavior, 16, 27-40.

Bendick, J., & Gallant, R. A. (1980). Elementary Science 5. Lexington, MA: Ginn and Company.

Bridge, C. A., Belmore, S. M., Moskow, S. P., Cohen, S. S., & Matthews, P. D. (1984). Topicalization and memory for main ideas in prose. Journal of Reading Behavior, 16, 61-80.

Cohen, M. R., Del Giorno, B. J., Harlan, J. D., McCormack, A. J., & Staver, J. R. (1984). Science. Glenview, IL: Scott, Foresman and Company.

Flood, J. E. (1975). The influence of first sentences on reader expectations within prose passages. Reading World, 18, 306-315.

Kieras, D. E. (1978). Good and bad structure in simple paragraphs: Effects on apparent theme, reading time, and recall. Journal of Verbal Learning and Verbal Behavior, 17, 13-28.

Kieras, D. E. (1980). Initial mention as a signal to thematic content in technical passages. Memory and Cognition, 8, 345-353.

Mallinson, G. G., Mallinson, J. B., Smallwood, W. L., & Valentino, C. (1984). Science. Morristown, NJ: Silver Burdett Company.

Williams, J. P., Taylor, M. B., & Ganger, S. (1981). Text variations at the level of the individual sentence and the comprehension of simple expository paragraphs. Journal of Educational Psychology, 73, 851-865.

Sund, R. B., Adams, D. K., Hackett, J. K., & Moyer, R. H. (1983). Accent on Science. Columbus, OH: Charles E. Merrill Publishing Company.

Taylor, M. B., & Williams, J. P. (1983). Comprehension of learning-disabled readers: Task and text variations. Journal of Educational Psychology, 75, 743-751.

Table 1

Main Idea Analysis for the Original and Rewritten Versions of the Cells Passage

Main idea structure[a]	Original version[b]	Rewritten version[b]
CELLS ARE THE BUILDING BLOCKS OF ALL ORGANISMS, OR LIVING THINGS.	Simple 2-1	1-1
1. Organisms have different numbers of cells.	Inferred 1/2-	2-1
2. Cells carry on the same activities of larger organisms.	Inferred 3-	3-1
3. Several different kinds of cells make up your body.	Simple 4-1	3-1
4. An organism grows because it produces more cells.	Delayed-Completion 5-1/3	5-1
5. Cells also help repair the body of an organism.	Simple 6-1	6-1

[a]The passage main idea is in upper case; the paragraph main ideas are numbered and in upper and lower case.

[b]The first digit represents the paragraph(s); the second digit represents the sentence(s) within that paragraph.

Table 2

Mean Performance on Questions 1, 2, and 3 by Version and Text

Original version				Rewritten version			
G[a]	F[b]	SM[b]	C[a]	G[b]	F[a]	SM[a]	C[b]
Question 1[c]							
.593	.466	.431	.519	.621	.611	.500	.586
Question 2[d]							
.117	.114	.056	.111	.147	.141	.125	.131
Question 3[e]							
2.593	2.517	2.172	2.296	2.517	3.037	2.370	2.138

Note: G = Glaciers, F = Force, SM = Scientific Method, C = Cells.

[a]Data gathered from Group 1 students.

[b]Data gathered from Group 2 students.

[c]Maximum score = 1.000.

[d]Maximum score = 1.000.

[e]Maximum score = 5.000.

Table 3

Mean Performance on Questions 1, 2, and 3 by Group Across Passages

Group	Original Version	Rewritten Version
	Question 1[a]	
1	.897	1.207
2	1.111	1.111
Across	1.000	1.160
	Question 2[b]	
1	.170	.278
2	.229	.266
Across	.198	.272
	Question 3[c]	
1	4.690	4.655
2	4.889	5.407
Across	4.786	5.018

[a]Maximum score = 2.000.

[b]Maximum score = 2.000.

[c]Maximum score = 10.000.

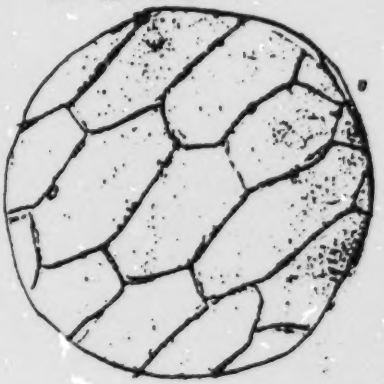
Figure 1. Original version of the Cells passage.

BEST COPY AVAILABLE

WHAT IS A CELL?

You cannot see each brick of your school building from far away. But up close you can see how each brick fits into place. In the same way, your body is made of many tiny pieces that fit into place. These pieces--or cells--are so tiny that you need a microscope to see them. Dandruff and peeled skin are really bunches of dead skin cells. These dead cells fall off, and living cells take their place. In all, more than a trillion cells make up your body.

Skin cells of an onion



Cells are the building blocks of all organisms. Many of the smallest organisms--monerans--are made of one cell. Some protists are also made of one cell, while others are made of many cells. The number of cells gets larger as organisms grow. This picture shows the many cells that make up a small piece of onion.

A cell is the smallest living part of an organism. A tiny cell on the tip of your nose carries on the same life activities as your whole body. Cells get energy from food. They use this energy to grow and to respond to their surroundings. Cells also reproduce--or make more cells of the same kind.

Many kinds of cells make up your body. You have skin cells, muscle cells, nerve cells, and bone cells. Your stomach, heart, lungs, and brain are made of cells. The picture shows that even your blood is made of cells.

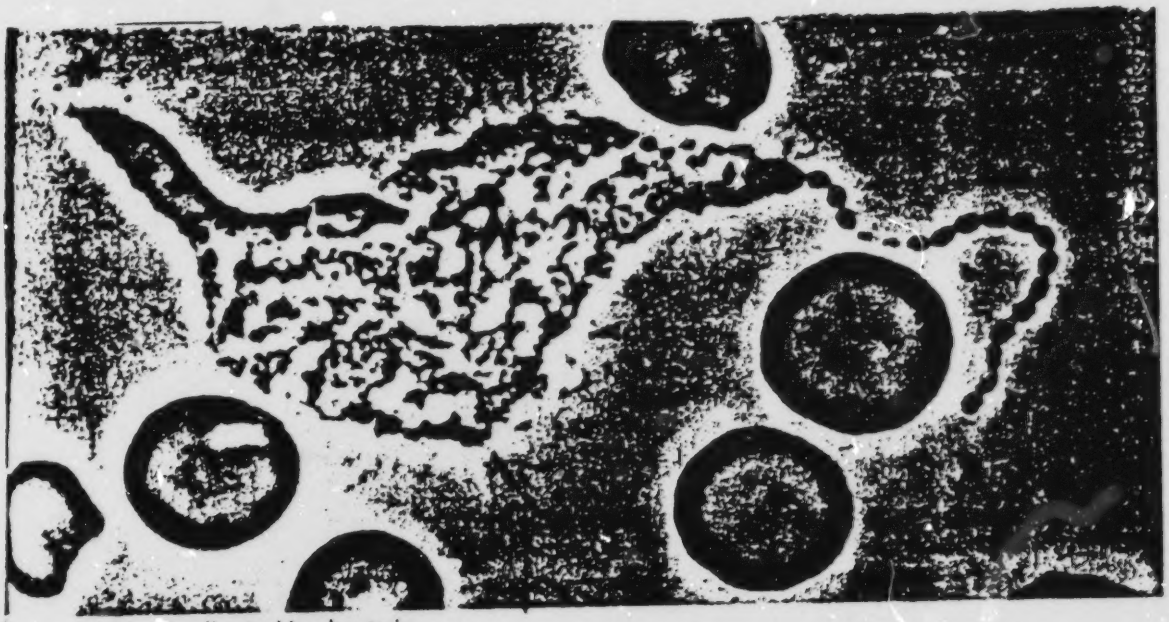
Blood cells

Figure 1 continued.

BEST COPY AVAILABLE

Cells help organisms grow. A puppy does not grow just because its cells get bigger. Instead, muscle cells produce more cells to make longer and stronger muscles. Also, skin cells produce more skin cells to make the skin larger. The number of cells becomes larger as the puppy gets older. The number of cells stops getting larger once the puppy becomes an adult dog.

Cells also help repair the body of an organism. For example, blood cells rush to a cut. Some blood cells form a scab to keep out bacteria and dirt. Other blood cells, such as the ones shown here, destroy any bacteria that entered through the cut. Underneath the scab, healthy cells produce new cells that take the place of the damaged ones. The scab falls off after the new cells are in place. Cells usually take a few days to repair a cut.



A blood cell attacking bacteria

BEST COPY AVA

Figure 2. Rewritten version of the Cells passage.

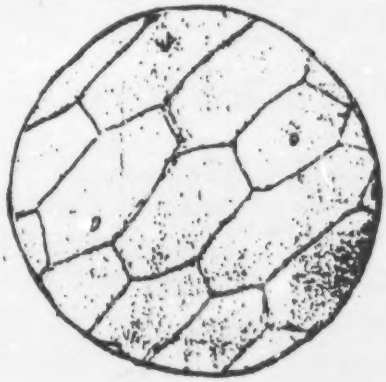
CELLS: THE BUILDING BLOCKS OF LIVING THINGS

Cells are the building blocks of all organisms, or living things. Just as bricks are the building blocks of your school, so too, cells are the building blocks of living things. You cannot see each brick of your school building from far away, but up close you can see how each brick fits into place. In the same way, your body is made of many tiny pieces, or cells, that fit into place. But cells are so small that you need a microscope to see them.

DIFFERENT NUMBERS OF CELLS

Organisms have different numbers of cells. Many of the smallest organisms, like monerans, are made up of only one cell. Some protists are also made up of one cell, while others are made of many cells. The number of cells gets larger as organisms grow. The picture shows the many cells that make up a small piece of onion. More than a trillion cells make up your body.

Skin cells of an onion



CELLS, THE SMALLEST LIVING PARTS OF ORGANISMS

Cells carry on the same activities of larger organisms. A tiny cell on the tip of your nose, for example, carries on the same activities as your whole body. Cells get energy from food, just like larger organisms. Cells use energy to grow and respond, just like larger organisms. And cells reproduce--or make more of the same kind--just like larger organisms.

DIFFERENT KINDS OF CELLS

Several different kinds of cells make up your body. You have skin cells, muscle cells, nerve cells, and bone cells in your body. Your stomach, heart, lungs, and brain are made of cells. The picture shows that even your blood is

Blood cells

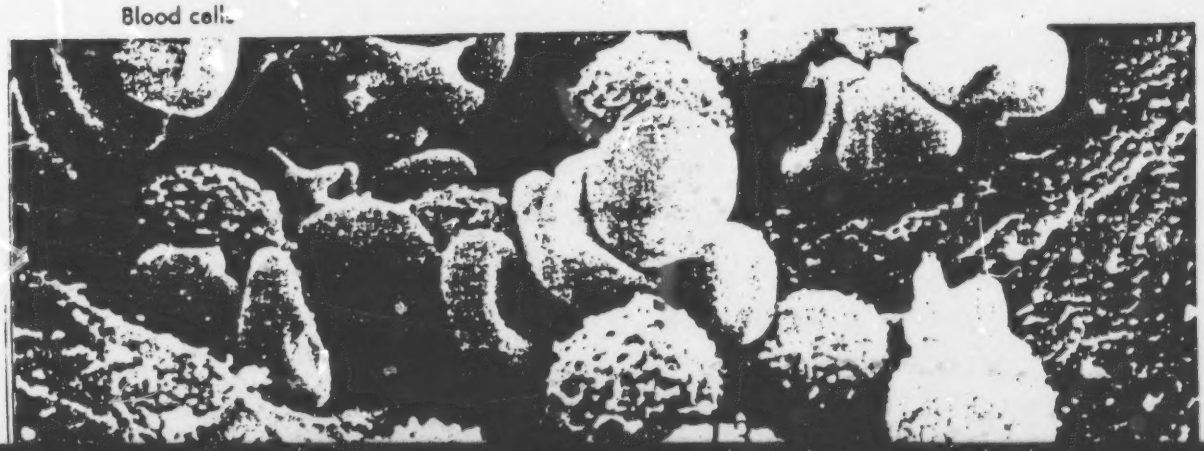


Figure 2 continued.

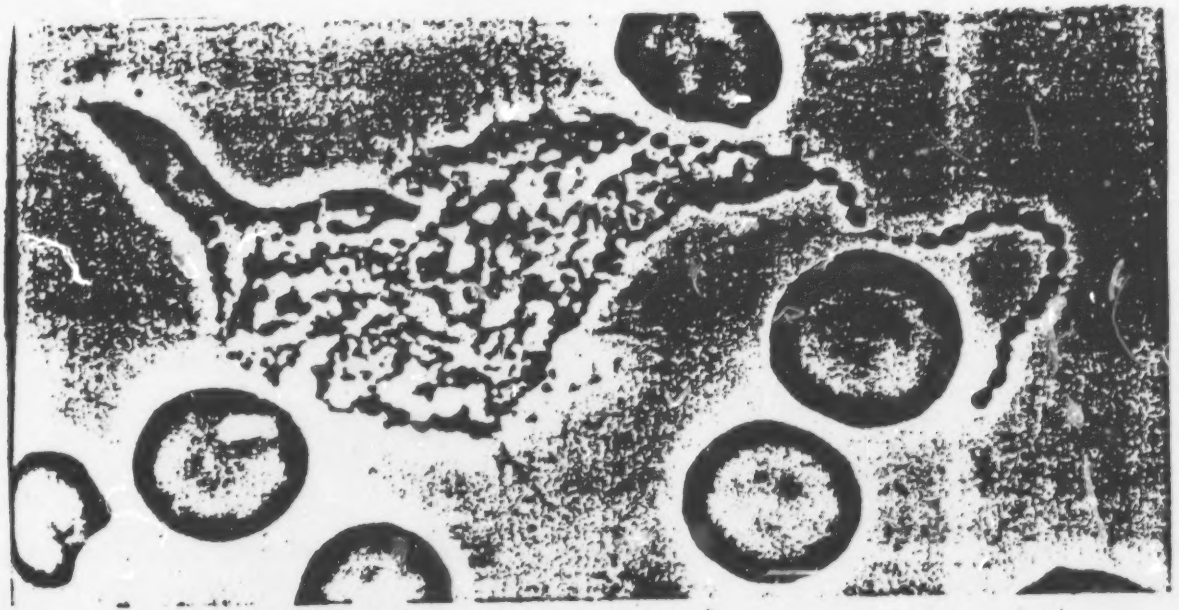
made of cells. Dandruff and peeled skin are really bunches of dead skin cells. These dead cells fall off, and living cells take their place.

CELLS MAKE ORGANISMS GROW

An organism grows because it produces more cells. A puppy does not grow because its cells get bigger. Instead, muscle cells produce more cells to make longer and stronger muscles. Also, skin cells produce more skin cells to make the skin larger. The number of cells becomes larger as the puppy gets older. The number of cells stops getting larger once the puppy becomes an adult dog.

CELLS REPAIR AN ORGANISM

Cells also help repair the body of an organism. For example, blood cells rush to a cut. Some blood cells form a scab to keep out bacteria and dirt. Other blood cells, such as the ones shown in the picture, destroy any bacteria that entered through the cut. Underneath the scab, healthy cells produce new cells that take the place of the damaged ones. The scab falls off after the new cells are in place. Cells usually take a few days to repair a cut.



A blood cell attacking bacteria

BEST COPY AVAILABLE